

TOPICS:

1) Radicals

- simplify
- add/subtract
- multiply
- rationalize denominator.

2) Exponents

- Zero
- Negative
- Fractional

3) Solving equations with fractional exponents
(Power equations)4) Solving Exponential equations.
(Variable in exponent)

5) Complex Numbers

- Powers of i
- Add/Subtract/Multiply $i^2 = -1$

6) Factoring

- GCF
- DOTS
- AM
- AC (split the middle)
- Grouping
- Sum/Diff of cubes (SOAP)

7) Rational Expression
(fraction)

- Simplifying
- Multiplication/Division
- Add/Subtracting
- Complex Fractions

Review Questions:

1) Factor: $x^6 + 8$

$\sqrt[3]{x^6} = x^2$

$\sqrt[3]{8} = 2$

$(x^2 + 2)((x^2)^2 - x^2(2) + 2^2)$

$$(x^2 + 2)(x^4 - 2x^2 + 4)$$

2) Express in simplest i form

$3\sqrt{8} + 5\sqrt{32}$

$$\begin{array}{l}
 \textcircled{3i\sqrt{8}} + \textcircled{5i\sqrt{32}} \\
 \begin{array}{l}
 \nearrow \sqrt{4}\sqrt{2} \quad \searrow \sqrt{16}\sqrt{2} \\
 3i \cdot 2\sqrt{2} \quad 5i \cdot 4\sqrt{2} \\
 6i\sqrt{2} \quad 20i\sqrt{2}
 \end{array} \\
 \downarrow + \\
 \textcircled{26i\sqrt{2}}
 \end{array}$$

$$3) (2c^{1/2}d)(c^{3/2}d^{-1}) = 2c^2d^0 = \boxed{2c^2}$$

$$4) \frac{\cancel{(2x)} \frac{3}{\cancel{2}} + \frac{3}{\cancel{x}} \cancel{(2x)}}{\cancel{(2x)} \frac{2}{\cancel{1}} + \frac{4}{\cancel{x}} \cancel{(2x)}} = \frac{3x+6}{4x+8} = \frac{3\cancel{(x+2)}}{4\cancel{(x+2)}} = \boxed{\frac{3}{4}}$$

LC D: $2x$
 $x \neq 0, 2$

$$4) \left(\frac{1}{3}\right)^{x+1} = 27$$

$$\left(3^{-1}\right)^{x+1} = 3^3$$

$$\begin{array}{r} -x-1 = 3 \\ +1 \quad +1 \\ \hline -x = 4 \\ \hline x = -4 \end{array}$$

$$5) (5y^7)^3 \text{ is equal to:}$$

$$(5y^7) \cdot (5y^7) \cdot (5y^7) = \boxed{125y^{21}}$$

$$6) \text{ Simplify: } (3-2i\sqrt{2}) + (6-i\sqrt{2}) - (2-4i\sqrt{2})$$

$$\underline{3-2i\sqrt{2}} + \underline{6-i\sqrt{2}} - \underline{2+4i\sqrt{2}}$$

$$7+i\sqrt{2} = \boxed{7+i\sqrt{2}}$$

$$7) \text{ Solve } 5+\sqrt{x+1} = x+4$$

$$\begin{array}{r} -5 \qquad -5 \\ \hline \end{array}$$

$$(\sqrt{x+1})^2 = (x-1)^2$$

$$x+1 = x^2-2x+1$$

$$\begin{array}{r} -x-1 \qquad -x-1 \\ \hline \end{array}$$

$$0 = x^2-3x$$

$$0 = x(x-3)$$

$$\begin{array}{c|c} x=0 & x=3 \\ \hline \text{reject} & \end{array}$$

$$\begin{array}{c} (x-1)(x-1) \\ x^2-1x-1x+1 \\ x^2-2x+1 \end{array}$$

Practice:

Simplify:

$$\textcircled{1} \frac{(x) \frac{4}{x^2-4}}{x(x-2)(x+2)} + \frac{-3}{2x-x^2} \quad \text{from bottom}$$

$$\frac{(x)(x-2)(x+2)}{x(x-2)(x+2)} \cdot \frac{x(2-x)}{x(x-2)(x+2)}$$

$$\text{LCD: } x(x-2)(x+2)$$

$$x \neq 2, -2, 0$$

$$\frac{4x}{x(x-2)(x+2)} + \frac{-3x-6}{x(x-2)(x+2)} = \frac{x-6}{x(x-2)(x+2)}$$

$$\textcircled{*} \frac{\begin{array}{r} -1 \\ 4-x \\ \hline x-1 \\ 1 \end{array}}{1} = \boxed{-1} \quad \left| \quad \frac{\begin{array}{r} -1 \\ 3-2x \\ \hline 2x-3 \\ 1 \end{array}}{1} = \boxed{-1}$$

$$\textcircled{10} \frac{\sqrt{3y+10} - 2}{+2} = y$$

$$(\sqrt{3y+10})^2 = (y+2)^2$$

$$3y+10 = (y+2)(y+2)$$

$$3y+10 = y^2 + 2y + 2y + 4$$

$$3y+10 = y^2 + 4y + 4$$

$$\frac{-3y-10}{-3y-10} \quad \frac{-3y-10}{-3y-10}$$

$$0 = y^2 + y - 6$$

$$0 = (y+3)(y-2)$$

$$\frac{y+3}{y-2} \quad y=2 \checkmark$$

reject

$$\sqrt{3y+10} - 2 = y$$

$$\sqrt{3(-3)+10} - 2 = -3$$

$$\sqrt{-9+10}$$

$$\sqrt{1}$$

$$1-2$$

$$-1 \neq -3$$

$$\textcircled{1} \quad 16^{x-1} = 8^x$$

$\textcircled{*}$ If the bases are =,
the exponents are =

$$(1) \ x = -1 \quad \boxed{(2) \ x = 4} \quad (3) \ x = \frac{1}{4} \quad (4) \ x = \frac{4}{3}$$

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No!

$$\begin{array}{ccc} (16)^{x-1} & = & (8)^x \\ \downarrow & & \downarrow \\ (2^4)^{x-1} & & (2^3)^x \end{array}$$

$$\begin{array}{r} 4x - 4 = 3x + y \\ -3x + 4 \quad -3x + y \\ \hline (x = 4) \end{array}$$

$$\frac{(3y+1) + (-y+1)}{(y-1)(y+1)} = \frac{2y+2}{(y+1)(y-1)} = \frac{2(y+1)}{(y+1)(y-1)}$$

14) From Test 3

restrictions:

$$x \neq 0, 3, -5$$

$$4, 2$$

$$\frac{\frac{-1}{(x-2)(x+5)} \cdot \frac{-1}{x(4-x)}}{\frac{x^2+3x-10}{6x-2x^2}} \cdot \frac{4x-x^2}{x^2+x-20} \cdot \frac{-1}{\frac{x-3}{2x-x^2}} = \frac{-1}{2x}$$

$$2x(3-x) \quad (x+5)(x-4) \quad x(2-x)$$

12) Simplify:

$$\text{LCD: } (y-1)(y+1)$$

$$y \neq 1, -1$$

$$\frac{3y+1}{y^2-1} - \frac{1}{y+1} \cdot \frac{(y-1)}{(y-1)} = \frac{3y+1}{(y-1)(y+1)} + \frac{-y+1}{(y-1)(y+1)}$$

$$= \frac{2y+2}{(y-1)(y+1)} = \frac{2(y+1)}{(y-1)(y+1)}$$

$$= \left(\frac{2}{y-1} \right)$$

Test 1

5) $\frac{a^{-2}b^3c^0}{a^{-3}b^5c^1} = \frac{a^1}{b^2c^1} = \boxed{\frac{a}{b^2c}}$

Test 2

11 Solve for x:

$$16^{3x} = 8^{x+1}$$

$$(2^4)^{3x} = (2^3)^{x+1}$$

$$16 = 2^4$$

$$\begin{array}{cc} 4 & 4 \\ \wedge & \wedge \\ 2 & 2 & 2 & 2 \end{array}$$

$$8 = 2^3$$

$$\begin{array}{cc} 1 & 2 \\ \wedge & \\ 2 & 2 \end{array}$$

$$\begin{array}{r} 12x = 3x + 3 \\ -3x \quad -3x \\ \hline 9x = 3 \\ \frac{9}{9} \quad \frac{3}{9} \quad x = \frac{1}{3} \end{array}$$

Solve for x

$$2(x+1)^{2/3} + 4 = 22$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\frac{2(x+1)^{2/3}}{2} = \frac{18}{2}$$

④ $\begin{array}{l} \text{even} \\ \text{odd} \end{array}$ $\rightarrow (x+1)^{2 \cdot \frac{3}{2}} = 9^{3/2}$

$$x+1 = \pm 27$$

$$\begin{array}{r} x+1 = 27 \\ -1 \quad -1 \\ \hline x = 26 \end{array}$$

$$\begin{array}{r} x+1 = -27 \\ -1 \quad -1 \\ \hline x = -28 \end{array}$$

from fractional exponents
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$$\left(\frac{4a^4b^6}{25a^{-1}b} \right)^{\frac{1}{2}}$$

$$4^{\frac{1}{2}} = \sqrt{4} = 2$$

$$25^{\frac{1}{2}} = \sqrt{25} = 5$$

$$\left(\frac{4a^5b^5}{25} \right)^{\frac{1}{2}}$$

$$= \frac{4^{\frac{1}{2}} a^{\frac{5}{2}} b^{\frac{5}{2}}}{25^{\frac{1}{2}}}$$

$$= \frac{2a^{\frac{5}{2}}b^{\frac{5}{2}}}{5}$$

Test 1

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$$\frac{6\sqrt{12x^7} + 4\sqrt{27x^3}}{2\sqrt{3x}}$$

$$\frac{6\sqrt{12x^7}}{2\sqrt{3x}} + \frac{4\sqrt{27x^3}}{2\sqrt{3x}}$$

$$\frac{3\sqrt{4x^6}}{1} + \frac{2\sqrt{9x^2}}{1}$$

$$3 \cdot 2x^3 + 2 \cdot 3x$$

$$6x^3 + 6x$$